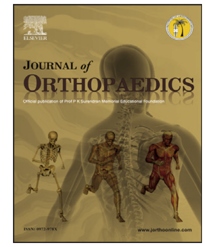
JOURNAL OF ORTHOPAEDICS 11 (2014) 58–63

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/jor



Original Article

Perioperative and acute care outcomes in morbidly obese patients with acetabular fractures at a Level 1 trauma center

Heather K. Vincent, Edward Haupt, Sonya Tang, Adaeze Egwuatu, Richard Vlasak, MaryBeth Horodyski, Donna Carden, Kalia K. Sadisivan*

Department of Orthopaedics and Rehabilitation, Divisions of Orthopaedic Trauma and Research, Interdisciplinary Center for Musculoskeletal Training and Research, University of Florida, Gainesville, FL 32611, USA

ARTICLE INFO

Article history:
Received 18 November 2013
Accepted 15 April 2014
Available online 10 May 2014

Keywords:
Acetabular
Fracture
Obese
Outcomes
Trauma

ABSTRACT

Background: Controversy exists regarding obesity-related injury severity and clinical outcomes after orthopedic trauma.

Purpose: The purposes of this study were to expand our understanding of the effect of morbid obesity on perioperative and acute care outcomes after acetabular fracture.

Methods: This was a retrospective review of patients with acetabular fracture after trauma. Non-morbidly obese (BMI < 35 kg/m^2) and morbidly obese (BMI ≥ 35 kg/m^2; $N = 81$). Injury severity scores and Glasgow Coma Scale scores (GCS) were collected. Perioperative and acute care outcomes were positioning and operative time, extra fractures, estimated blood loss, complications, hospital charges, ventilator days, transfusions, length of stay (LOS) and discharge destination. Positioning and operative times were longer in morbidly obese patients ($p < 0.05$). No other differences existed between groups.

Conclusions: Orthopedic trauma surgeons and care teams can expect similar acute care outcomes in morbidly obese and non-morbidly obese patients with acetabular fracture.

1. Introduction

Injuries to the pelvic ring are serious and potentially life-threatening injuries that typically occur after a high velocity or impact blunt trauma.[1] Acetabular fracture treatment is challenging and often involves stabilization of the patient followed by anatomic reduction with rigid internal fixation.[2] Stabilization and anatomic restoration of these articular fractures in patients can result in a very good prognosis in over >70% of persons with healthy weight.[3,4] Morbidly obese patients admitted with orthopedic trauma have unique physical challenges and pathophysiology, which can affect the trauma team's decision-making processes.[5] Morbid obesity is commonly perceived to adversely affect the surgical repair process and perisurgical outcomes and to incur significant hospital resource use. Modifications in pre-operative planning and intraoperative strategies may be required in

* *Corresponding author*. Department of Orthopedics and Rehabilitation, Division of Research, UF Orthopaedics and Sports Medicine Institute, PO Box 112727, Gainesville, FL 32611, USA. Tel.: +1 352 273 7459 (office); fax: +1 352 273 7388.

E-mail address: vincehk@ortho.ufl.edu (H.K. Vincent).

http://dx.doi.org/10.1016/j.jor.2014.04.016

order to accommodate the morbidly obese patient and minimize risk.[6]

It has been documented that morbidly obese patients may be the most complicated to treat, due to the need for special surgical tables, extra staffing and additional diagnostic imaging to obtain appropriate views of the fracture area.[7,8] Obesity can significantly increase the technical difficulty of performing pelvic and acetabular surgeries,[9] can increase the length of the surgical incision and amount of dissection,[10] and may contribute to a greater likelihood of perioperative complications after acetabular fracture repair.[11,12] On the operating table, challenges include intubation, positioning, intraoperative fluoroscopy, and accession of blood vessels.[8] These obesity-related difficulties are assumed to be associated with higher utilization of hospital resources and hospital charges, but this has yet to be shown. Controversy exists regarding obesity-related injury severity and clinical outcomes.[13] In our recent work, we found that obese patients with orthopedic trauma who underwent inpatient rehabilitation actually had similar clinical outcomes and functional gain by discharge.[14] Furthermore, even morbidly obese patients achieved meaningful functional gains and were discharged within similar time frames as the non-obese patients. It remained unclear whether or not there were biases of these outcomes due to the selection of patients who could tolerate aggressive therapies into a post-acute inpatient rehabilitation setting. Examination of the effect of morbid obesity on perioperative and acute care outcomes and discharge destination would eliminate this bias. Hence, the main purposes of this study were to expand our understanding of the effect of morbid obesity on perioperative and acute care outcomes after acetabular fracture. We hypothesized that patients with body mass index values ($BMI \geq 35$ kg/m^2) would demonstrate worse perioperative and acute care outcomes and greater hospital resource utilization than non-morbidly obese patients with $BMI < 35$ kg/m^2.

2. Patients and methods

2.1. *Study design*

This was a retrospective study using data compiled from computerized medical records systems and billing, the Trauma Registry and patient charts from a Level 1 regional referral trauma center. This investigation was approved by the Institutional Review Board at the University of Florida. A waiver of informed consent was obtained because of the deidentified nature of the data. Team members collected and verified all data (EH, HKV). Data were entered into the statistical software (EH), cleaned, and verified by other study team members (ST, HKV). Reliability was periodically checked by the primary author in a process of randomly reviewing charts and the electronic transcription.

2.2. *Patients*

Patients with a major primary diagnosis of a traumatic acetabular fracture (without brain injury or paralysis) were included in the patient pool. Attempts were made to match patients by age, race and sex where possible to reduce possible confounders in the analysis. Patients with high impact trauma-related event such as motor vehicle accidents (E810-E819) were included. The diagnosis was identified by the primary International Code of Disease (ICD-9) number of the patient file, and was confirmed within the medical record discharge summary. A total of 85 patients were identified within the study time frame, and four were eliminated due to incomplete data. The goal was to match 3 non-morbidly obese patients for every morbidly obese patient as a matched pair comparison. All patients were treated within a standardized trauma protocol, under the care of one of three surgeons. Patients were classified as non-morbidly obese if the BMI was <35 kg/m^2, and patients were classified as morbidly obese when BMI was ≥ 35 kg/m^2 with at least one other comorbidity.[15]

2.3. *Characteristics*

Demographic variables, the type and number of comorbidities, were obtained from the admission notes of the electronic medical record. Specific characteristics included age, gender, race, ethnic group, BMI, insurance status (private; public; none), number of comorbidities, Injury Severity Score (ISS),[16] Abbreviated Injury Scale (AIS) score,[17] Glasgow Coma Scale (GCS)[18] and fracture type. The ISS can be used as a proxy for trauma severity,[19] and is recommended for use in research involving hospital length of stay.[20] The AIS is considered a more accurate consensus-derived injury severity than the ISS, but when used together (with age and physiological variables), these measures can predict clinical outcomes after trauma.[21] The AIS for the primary, secondary and tertiary sites were obtained. The GCS is a standardized measurement for assessing the degree of consciousness and predicting the duration and ultimate outcome of coma. The assessment includes eye opening, verbal response, and motor response; each response is evaluated independently according to a rank order that indicates the level of consciousness and functional impairment. The GCS has moderate levels of inter-rater agreement when administered in the emergency department, with a Spearman rho of 0.808.[22] If applicable, the number of other fractures was recorded from the admission notes. The GCS measures were obtained at the time of paramedic arrival, and the ISS and AIS were obtained upon admission to the acute care service.

2.4. *Perioperative outcomes*

Several perioperative parameters were collected from the surgeon's notes. The research team followed specific instructions for chart abstraction procedures. Three trauma surgeons performed the surgeries documented in this study, and the surgical approach was documented. Perioperative outcomes included positioning time, total operative time and estimated blood loss. If applicable, postoperative complications were recorded, and these included renal insufficiency, respiratory complications (acute distress, difficult ventilation during surgery, respiratory insufficiency, bilateral effusions, pneumonia), cardiac arrhythmias, vascular complications including deep venous thrombosis or pulmonary embolism and infections (urinary tract infection, respiratory infection, methicillin-resistant *Staphylococcus aureus* and others).